

## Dr. Parsons's Report to the Local Government Board on the Prevalence of Scarlet Fever and "Fever" in the Llanelly Urban Sanitary District.

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LLANELLY, the most populous place in Carmarthenshire, although not the county town, is situated in the south-western part of the great South Wales coal field, on the north shore of the Burry estuary, at the point of embouchure of two small rivers, the Lliedi and the Dafen. The town is included in the Llanelly sub-district of the Llanelly Registration District, but it unfortunately happens that the urban sanitary district, the registration sub-district, the parish, and the parliamentary borough have each different limits, not one of these divisions being conterminous with either of the others. The area of the Urban Sanitary District of Llanelly is 2,000 acres; the population was 14,973 in 1871, and is estimated at 18,673 in the middle of 1879.

The principal industries are coal mining, copper smelting, lead smelting, iron works, the manufacture of tin plate, and the making of bricks and pottery. There are also docks for shipping. Of late years there has been a good deal of depression of trade and consequent poverty, but several large works have recently been reopened. Some female hands are employed in the tin-plate works, but no great proportion of the women go out to work.

The town is situated on a tract of flat low-lying marshy land, and on the lower slopes of the hills which bound it. Geologically it rests upon the coal measures, which rise to the surface in the hills, but in the low ground are covered up with alluvial deposits. In this part of the town the sites of buildings often require to be filled up to the street level, furnace ashes and slag being the materials commonly used for the purpose.

Recent extensions of the town have taken place chiefly in the low-lying portion, in which the large works are all situated.

Llanelly has now been four times inspected on behalf of the Central Health Authority. The first of these inspections was made by Mr. G. T. Clark for the General Board of Health in 1850, previous to the formation of the Local Board of Health. At that time the town was in a very filthy state; the so-called sewers formed a vast reticulated cesspool beneath the surface; the water supply was scanty and bad, being obtained from polluted springs and water-courses; there was no scavenging other than of the chief roads, and large quantities of filth were stored in close proximity to the houses. Filthy pigstyes and crowded burial grounds added to the general sum of foulness of the town, and malarious diseases were rife in the low-lying marshy parts.

In 1866 an inquiry was made into the sanitary state of Llanelly by Dr. Hunter for the Medical Department of the Privy Council. "From his investigations it appeared that there was still a great deal of surface foulness in the neighbourhood of houses, not however so much from filth scattered about indiscriminately, as from the storage of human and porcine ordure, and from the vast number of pigstyes. Also that a new system of main drainage had been to some extent carried out, and put in operation about a year; but that this had not given unmixed satisfaction, partly from the sluggish flow of sewage in the sewers, in consequence of the slight fall it had been practicable to give them in their course along the flat ground towards the outlets, and of an insufficient water scour; partly from subsidence of the sewers at certain points in the flat ground, and the deposit of foul matter at such points."

The third inspection, which was called for on account of the persistent prevalence of enteric fever in the town, was made in 1870 by Mr. Netten Radcliffe, from whose report the foregoing particulars respecting the previous sanitary history of the place are taken. Important sanitary works had been carried out by the Local Board of Health in the period which had elapsed since its formation in 1850. The water supply, which in that year was miserably

scanty, and in 1866 was wholly insufficient, was in 1870, in consequence of works carried out by the Local Board, abundant. The sewerage, which in 1850 was represented by 2,530 yards of square drains having no bottom but the soil, and only 530 yards of sewers having an oval cross-section, in 1870 consisted of 7,000 yards of main sewers built in accordance with the most approved principles, and of 1,400 yards of glazed stoneware pipe drains. The scavenging, which in 1850 dealt only with the highways, had been extended to all parts of the town upon a systematic plan, the daily removal of all the dry refuse of the population being attempted. Nuisances from various sources had been brought under control; the burial grounds within the town had been closed, and the marsh land in the suburbs drained or cultivated.

The present inspection, made in February 1880, was undertaken in consequence of an epidemic of scarlet fever, which began in the spring of 1879, and after almost subsiding broke out again in the following winter; and also on account of the continued prevalence of enteric fever. Before speaking of what was ascertained respecting the prevalence of these diseases and the probable causes of this prevalence, it will be convenient to give some particulars respecting the present sanitary condition of the town, as compared with what it was at the date of Mr. Radcliffe's inspection. It is evident that in the interval the Sanitary Authority have shown a most praiseworthy activity in improving the sanitary condition of the place, although for financial reasons they have been compelled somewhat to diminish the amount of work, both public and private, carried out in the past two or three years of commercial depression.

*House Accommodation.*—Although in the older parts of the town there are some narrow confined courts and alleys, yet on the whole the houses have plenty of air space. The more modern artisans' houses are mostly in rows, each house standing on a plot of ground commonly 100 feet in depth from front to back. The necessary outbuildings are at the farther end of the plot, some 80 feet from the houses, and are approached by back streets. Most of the houses have through ventilation; in 1878, of 3,551 houses, 3,074 had doors and windows both at back and front, leaving 477 not so provided, these being old cottages. In 1877 the corresponding numbers had been 2,955 and 529, but (before the enumeration of 1878) some of the houses without through ventilation had been closed and others had had doors and windows opened at the back. The older cottages are many of them very wretched, damp and dilapidated, with earthen floors below the level of the ground; the few small windows admitting little light and no air; and with water dripping from the thatched roof and soaking into the foundations; conveniences of all kinds are absent. The want of eavespouting with the consequent dampness of the walls is a common defect even in cottages of more modern date. The newer cottages are of good construction, but the interiors were not always found so clean as they should be.

*Sewerage.*—There are at the present time in the district about 5 miles of egg-shaped brick culverts and  $13\frac{1}{4}$  miles of glazed earthenware pipes, making altogether some 32,000 yards of sewer against 8,400 at the time of Mr. Radcliffe's inspection. There are however some parts of the town which still remain unsewered, *e.g.*, the Wern, a suburb on rising ground to the east, and some streets at Machynis, New Dock, and Sea Side, places on the low lying ground on the south of the town. It is said that in the latter parts the construction of sewers would be attended with difficulty on account of the small amount of fall available. In the unsewered parts of the town waste liquids are thrown either into the road channels which convey them into watercourses, or upon the ground, to soak away as best they can.

It is stated that there is not at the present time any considerable deposit of sediment in the sewers, which are well scoured out by the great volume of water passing through them; the whole of the upper waters of the Lledi being intercepted and diverted into the water mains, whence after use they find their way into the sewers. The outfalls, of which there are two, one at the New Dock, the other at the Lead Works Dock, are tide-locked for not more than an hour each day, except at spring tides. When the New Dock outlet was visited the tidal valve was completely under water, yet the sewage issued from it in a full stream.



The sewers are ventilated by shafts in the crown of the road about every 60 yards ; in some of these which are near houses charcoal baskets are inserted. No offensive effluvia were observed to issue from the sewers.

Of the 3,551 houses in the district in 1878, 2,298 were drained into the sewers, and 1,253 were not connected with them. Of these latter the majority were beyond the reach of the then existing sewers, but in respect of 810 houses situated within 100 feet of sewers, the owners had not complied with the Sanitary Authority's notice to make the necessary connections. The branch drains are of glazed socket pipes, but in a few cases square stone drains are stated still to exist in connection with old property. The drain inlets are trapped and are in the open air.

Where back streets exist the sewers are usually carried down them ; as the waterclosets are commonly at the lower end of the back yards or gardens, the length of branch drain which the excreta have to traverse is thus diminished.

*Water Supply.*—At the date of Mr. Radcliffe's inspection this was derived from two sources : 1st. A reservoir at Trebeddod containing 8,000,000 gallons, formerly the sole source of supply, but then and now retained as a reserve to supplement the ordinary supply. 2nd. A temporary supply derived from the river Lliedi, the waters of which were intercepted at Cwm Lliedi 3 miles above Llanelly, and after passing through straining tanks were conveyed by a line of earthenware pipes into an iron cistern from which they were distributed by gravitation to the town. Since that time a new reservoir, containing 160,000,000 gallons, has been constructed by damming up the Lliedi where it passes through a narrow rocky gorge about a mile below the former intake. This reservoir was opened in September 1878. The quantity of water thus capable of being stored is sufficient to insure to the inhabitants of Llanelly a constant and abundant supply for many years to come. If the quality of the water were as satisfactory as its quantity, the water supply of Llanelly might be considered unexceptionable, but unfortunately this is not the case for several reasons.

1st. In the first place there is no by-wash to the Lliedi reservoir, the configuration of the ground, with steep hills running down abruptly into the water on either side, rendering the construction of a side channel difficult and costly. In consequence of this omission in times of flood a large quantity of mud washed down by the Lliedi is carried into the reservoir, the waters of which, on the occasion of one of my visits, were brown and muddy from the effects of recent rains ; water drawn from pipes in the town was also turbid. The Trebeddod reservoir on the other hand is provided with a by-wash, down which the stream which supplies it is diverted in times of flood, and the water of this reservoir is thus kept clear and transparent, being used to supply the town when the Lliedi water is turbid.

2nd. The omission to provide a by-wash is of the more consequence owing to the fact that the water is delivered to the town in its unfiltered state, there being no filter-beds. It was attempted by the engineer to make up for this deficiency by providing an arrangement by which the water could be drawn off for use from near the surface of the reservoir, where it would be soonest purified by subsidence, but this expedient does not appear to be wholly successful, the sediment not subsiding with sufficient rapidity.

3rd. The bottom of the new reservoir, which was originally marshy and meadow land, was not puddled or concreted when the reservoir was made, but the vegetable matters, living and dead, which covered the ground were submerged when the water was let in, and were allowed to decay in it. The reservoir was however scoured out two or three times by filling it with water and letting it run off before it was filled for use.

In his Annual Report for 1878 the Medical Officer of Health writes thus :—

“ It is early yet to speak definitely of the quality of the water supplied by this reservoir, but I may state that this has not so far fulfilled my expectations, containing, as it does, a higher percentage of organic matter than that which ordinary drinking water should possess. This, no doubt, arises from the decomposition that the vegetable matter has undergone, which was submerged when the reservoir was filled, and also from the filth which is inseparable from the construction of a new reservoir.”

The temporary huts for the lodgment of the men employed in the construction of the new reservoir were built near it, and one, it is said, on its site.



4th. The streams supplying both reservoirs, but especially the Lliedi, are undoubtedly liable to contamination with matters of animal and human origin, which find their way into them in the upper part of their course.

(a.) Lliedi basin.—The area of the basin supplying the Lliedi at the point whence the former supply was taken is given by Mr. Radcliffe as about 35,000 acres; that supplying the present reservoir will be considerably larger, since the point of interception is now a mile lower down the valley. The ground is mountainous; the soil consists of coal measure shales and sandstones, covered in the hollows with glacial beds and peat; the surface being mostly hilly pastures, boggy in places, the remainder consisting of arable land and woods, with a little moorland. In this area are two hamlets, called Five Roads and Horeb, with many scattered farmsteads and cottages; altogether the number of houses cannot be less than 75 (50 were visible from one point), and may be more; containing probably a population of somewhere about 400 human beings, beside many domestic animals. The farmsteads contain, in close proximity to the houses, large heaps of manure, upon which, in the frequent case of the absence of privy accommodation, human excreta and house refuse are thrown. At the lower part of the farmyard is frequently a streamlet or spring, which at its head (but not always there free from the risk of pollution) supplies the water for the requirements of the household, and lower down receives the runnings from the farmyard, which it conveys towards the reservoir. In some instances the runnings from the farmyard have been diverted into a trench contouring the hill side, so as to irrigate the pastures; but even in this case it is highly probable that in wet weather foul matters may be washed into the streams, and therefore into the reservoir, from the irrigated fields: the same may also happen from those dressed with solid manures. At the farm at Cwm Lliedi, close to the head of the reservoir, noted by Mr. Radcliffe as formerly polluting the stream, a tank has been constructed to catch the liquid manure, but a certain quantity was found to be still running into the stream. A far greater quantity of pollution however is contributed by a larger farm called Ystrad Fay, not far off, the whole of the drainage of the farmyard being conveyed by a small mill stream direct into the reservoir.

(b.) Trebeddod basin.—The area of this is about 350 acres, its character being similar to that of the Lliedi basin. It contains some 15 houses, mostly small farms, the sanitary circumstances of which are similar to those in the other valley, except that the liquid manure is in almost all cases diverted over the fields, so that, as the water is not allowed to run into the reservoir in wet weather, there is less likelihood of contamination arising from this source. In this valley a small colliery working has recently been reopened, which drains into the stream. In addition to the above-mentioned houses there are four cottages at Trebeddod, near the upper end of the reservoir, from which, at the time of Mr. Radcliffe's inspection, there was a danger of pollution reaching the stream. A channel discharging into the by-wash has since been made between the feeder of the reservoir and these houses, so as to intercept any foul matters from them which might otherwise be washed into the stream.

The Urban Sanitary Authority have taken some measures for the protection of their water from fouling by the population above; but do not appear to have taken any steps to ascertain the full extent to which the fouling takes place. They are also, as their clerk stated, met by the difficulty that as the gathering grounds are situated not in their district, but in that of the Llanelly Rural Sanitary Authority, they have not power to proceed against the pollution as a nuisance, but only under the less direct and more troublesome process of sect. 69 of the Public Health Act, 1875, or of sect. 3 of the Rivers Pollution Prevention Act, 1876.

From the reservoirs to the town the water is conveyed by cast-iron mains 18 inches in diameter, varnished by Dr. Angus Smith's process; these are kept constantly charged, so that it does not appear possible that any contami-



nation of the water can take place between the reservoirs and the ramifications of the mains in the town. The water is supplied by a constant service to all parts of the town, unless when particular street mains have to be shut off for repairs. Before the construction of the new reservoir a high part of the town, called Mount Pleasant, was in dry summers badly supplied with water, the pressure in the pipes being insufficient to carry it thither.

The houses have each a separate tap, with the exception of the poorest, which are supplied from public stand pipes.

The waterclosets are flushed, as a rule, by service cisterns; these are compelled to be provided in all new erections, and their use has gradually been enforced in the case of old waterclosets flushed direct from the pipes. A few however were found which were still flushed from the pipes by means of screw-down taps. To save expense the waterclosets are frequently built in pairs, one service cistern serving for the two.

At the time of inspection, just on the breaking up of a long frost, an enormous amount of waste was going on from pipes burst by the frost and from taps left open to keep the pipes from freezing. The valves of the flushing cisterns were in many cases fastened open.

In some parts of the town the soil is largely made up of furnace ashes; in this material the service pipes, which are of lead, rapidly corrode, and leakages from this cause are somewhat frequent.

*Excrement Disposal.*—At the time of Mr. Radcliffe's inspection there were about 400 waterclosets in the town, and it was estimated that five sixths of the population used privies or adopted other and less formal means for the deposit of their excrement. In some of the privies the receptacle for the excrement was a middenstead, in others a cesspit, in others again a box or pail under the seat.

Since that time much has been done in the way of enforcing privy accommodation for houses devoid of it, in abolishing middens and cesspits, and in substituting waterclosets and pails, the pail system of collection of excrement having been introduced by the Sanitary Authority. As the result of a house-to-house survey in 1878, the Inspector of Nuisances reports that there were in that year in the town 1,530 houses provided with waterclosets, 616 with midden or cesspit privies, 749 with "Board pails," 487 with other pails or boxes, and 169 houses without either of these appliances.

The waterclosets are, as a general rule, outside the houses, and consist of a simple hopper and trap; they are flushed either by hand or from service cisterns, or (in a few cases only) by screw-down taps. Waterclosets do not appear to answer very well for the poorest class of houses, the occupants of which have not learnt to use them properly. Many such waterclosets were found letting water run to waste; others could not be flushed, owing to the flushing apparatus having got out of order; some had the pan broken, and others were choked up. Among a population of the poorest class trough closets, attended to daily by servants of the Sanitary Authority, would probably answer better than the ordinary watercloset.

Trough closets are in use at the Copper Works School, Llanelly; but their construction is open to improvement; the trough is of wood, with a flat bottom, and in one case the flushing pipe is at the same end as the plug, so that the trough cannot be properly washed out.

The "Board pail closets" are similar in construction and management to those in use at Rochdale, except that the lids of the pails do not fit closely upon an india-rubber packing, nor do the doors of the van fit so as to be airtight. The contents of the pails are tipped into a vat containing fine sifted ash, with which they are mixed up into a mass; this is then dried on a hot floor, sifted, and used with fresh quantities of excrement, the process being several times repeated with each quantity of ash. The resulting manure is sold at 2s. 6d. a load, but there is a difficulty in disposing of it, and a considerable accumulation at the dépôt. The pails after emptying are washed out and rinsed with carbolic acid solution. Formerly sulphuric acid and other chemicals were used in the manufacture of the manure, but their use is now abandoned, except a small quantity of carbolic acid to retard putrefaction.

The "Board-pail" system is in use mostly in the poorer parts of the town, and those unprovided with sewers; in such situations it seems to answer

very well from a sanitary point of view, but it is not in favour at Llanelly. The Sanitary Authority formerly granted a concession of the manure to a patentee, by whom the removal was not carried out with sufficient care to avoid creating nuisance, and whose failure involved the Authority in considerable expense. At the present time the removal is carried out by the Authority, and the system works it is said more satisfactorily in all respects, but it still entails a cost of about 1*l*. per closet annually. To avoid this expense the Authority now favour the erection of waterclosets rather than "Board-pail" closets.

The other forms of privy are in use mostly in connexion with detached and outlying houses, where the excrement is wanted by the occupiers as manure; the number of such privies is being gradually diminished. When such privies are required to be emptied by the Authority a charge is made for doing the work, but the emptying of the "Board-pails" is done free of cost to the occupier. The removal of excrement appeared to be efficiently carried out; no accumulations were observed.

The removal of ashes and dry refuse is effected as at the time of Mr. Radcliffe's visit, by carts belonging to the Sanitary Authority which perambulate every part of the district daily. The ashes are required to be placed by the house holders in boxes or pails, and left outside the doors to be tipped into the cart when it passes on its rounds. In some cases through the careless habits of the tenants heaps of ashes were thrown about the back premises; in one case a large heap of ashes was piled up on each side of the wall of a small backyard to enable a pony to surmount the wall in order that it might be kept in the yard and got in and out without bringing it through the house.

The ashes are removed to two depôts, one at the north the other at the south of the town, whence they are fetched away by farmers. No nuisance was observed from these depôts.

*Offensive Trades.*—Pig keeping was formerly very prevalent in the town, but has been diminished very much of late years, partly because it does not pay, partly through the action of the Sanitary Authority, in putting in force a byelaw which forbids the keeping of a pig within 100 yards of any dwelling house.

The Sanitary Authority have erected a spacious and well built abattoir, which is a source of pecuniary profit to the town. There are no private slaughterhouses.

*Vital Statistics.*—These are given in the following table, from the returns furnished to the Medical Officer of Health:—

Year.	Estimated Populatn.	Births.		Deaths.		Deaths from												Deaths under 1 Year old.		
		Number.	Rate per 1,000 Population.	Number.	Rate per 1,000 Population.	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Whooping Cough.	Fever.		Diarrhœa.	Phthisis.	Inflammations of Lungs.	Injuries.	Number.	Per 100 Births.		
											Enteric.	Other.								
1873	-	16,000	707	44·2	377	23·5	—	—	22	—	4	17	2	14	48	54	14	98	13·8	
1874	-	16,416	760	46·3	371	22·4	—	8	23	—	3	8	1	6	37	47	14	116	15·3	
1875	-	16,930	781	46·1	371	21·9	—	5	8	1	12	12	1	8	43	62	9	110	14·1	
1876	-	17,399	784	45·1	347	19·9	1	4	6	—	1	22	2	4	55	42	12	94	12·0	
1877	-	17,844	758	41·1	355	19·8	—	4	1	1	—	13	5	4	51	62	5	83	10·9	
1878	-	18,260	698	38·2	389	21·3	—	7	—	—	35	18	1	5	38	101	5	106	15·2	
1879	-	18,673	749	40·3	491	26·4	—	—	98	2	1	10	5	8	54	80	13	114	15·2	
Average	-	17,350	748	43·0	386	22·2	0·01	0·23	1·30	0·03	0·46	0·96		0·40	2·60	3·69	0·60	103	13·8	
England and Wales.	—	—	35·9	—	21·5	0·08	0·36	0·74	0·12	0·50	0·46		0·82	2·15			3·40	0·75	—	14·7
																			1873-77.	

Rates per 1,000 population per annum.

The death-rate is shown to have been steadily decreasing until raised in 1878 by the prevalence of whooping cough and inflammations of the lungs, and in 1879 still more by the epidemic of scarlet fever. The infant



mortality is low; it is said that mothers usually feed their babies at the breast.

*"Fever" and particularly Enteric Fever.*—From the description which has been given of the sanitary state of Llanelly it will be seen that it is a place where the sanitary authority have shown a large amount of activity in remedying unwholesome conditions, especially those upon which the occurrence of enteric fever usually depends. It is unfortunate that no series of mortality returns exist sufficiently extended to permit of an accurate judgment being arrived at as to the influence of this activity in diminishing the prevalence of "fever" and of the particular diseases included by the Registrar General under that generic name, within the Urban Sanitary District of Llanelly. An approximate notion may however be formed of the general diminution of "fever" in the aggregate in the locality, by comparing the figures given by Mr. Clark in the inquiry made for the General Board of Health in 1850, relating to the Llanelly Registration Sub-district (of the population of which the Urban Sanitary District contains about four-fifths) with those given in recent years for the same sub-district, in the quarterly returns of the Registrar General. According to the figures given by Mr. Clark the mortality from different kinds of fever in the Llanelly Sub-district during the 12 years 1838–49 was as follows:—

Typhus fever	-	-	-	-	23
Continued fever	-	-	-	-	170
Remittent fever	-	-	-	-	42
Total	-	-	-	-	235

or on an average 19·6 yearly. Estimating the mean population at 10,000, these are equivalent to an annual rate of 1·96 per 1,000. In the seven years 1873–79, 140 deaths from "fever" occurred in the sub-district, equal on an average to 20 yearly, or taking the mean population at 21,350, to an annual rate of 0·94 per 1,000, nearly the same as that given for the Urban Sanitary District in the table on page 6. Thus the fever death-rate in the sub-district has been reduced by one half, a diminution in which the Urban Sanitary District, containing as it does four-fifths of the population of the sub-district, must have largely shared.

It may be therefore inferred that a very marked diminution has occurred in the prevalence of "fever" in Llanelly within the last 30 years, and that this has been owing to the sanitary improvements effected by the Local Board of Health; and further it is a reasonable inference that this diminution has particularly occurred in respect of the fever now designated enteric fever. The persistence however of enteric fever in the Urban Sanitary District indicates that there are sources of fever affecting the district that the sanitary measures which have been carried out, large and important as they have been, have not sufficed to eradicate. With a view to ascertain the local conditions which foster and keep up the continued prevalence of enteric fever in the district all the houses were visited in which deaths from fever had occurred during the past three years. It did not seem worth while to carry the investigation in this direction further back, since in a town like Llanelly families are frequently changing their abode, and houses undergoing alteration, rendering it difficult or impossible to ascertain after the lapse of a few years what was the state of things which existed when the fever occurred. The result of these inquiries was to show that the fever, which in the majority of the cases was described by the medical men who certified the cause of death as "typhoid" or "enteric," was not confined to any particular part of the town, nor to any one period of the year, the deaths being pretty evenly distributed through the whole period under consideration.

The local conditions disclosed by this inquiry known to be influential in promoting enteric fever, together with other circumstances tending to the same result, may be summarily stated as follows:—

(a.) In about one third of the cases inquired into, local nuisances of a kind causing excremental pollution of the air were found still existing, or had existed until the occurrence of the fever had called attention to them. As examples the following may be quoted:—

*King Square.*—Death from enteric fever in October 1877. Privy abuts on house, is flushed by hand into the sewer through an old square stone drain. An untrapped inlet communi-



eating with this drain is situated in an outbuilding into which the back door of the house opens.

*Porth tywyll, Water St.*—Death from enteric fever in October 1879. Houses old and dilapidated, without through ventilation, in a narrow court, shut in by high walls and approached only by an archway in which the watercloset is situated. Drainage through an old square stone drain; leakage from a privy belonging to an adjoining house runs over the surface of the court.

20, *Mansel St.*—A death certified from typhoid fever in May 1879. Watercloset in back yard, handflushed, the pan loose, said never to have been cemented down, allowing a powerful current of sewer air to come up from under the seat.

The cases in which conditions of this kind were found were mostly of recent occurrence; it is not improbable therefore that such conditions may have existed in some of the earlier cases, in which, owing to alterations having been subsequently made or to the parties having removed, no local cause could be made out. There were two instances in which two cases of fever had occurred in particular houses at intervals of many months, indicating some local cause no longer discoverable.

(b.) A part of the town called Sea-side, in which many cases have occurred, is built upon an artificial site consisting of loose blocks of slag. Until recent years the mode of excrement disposal in this part was by means of cesspits and middens; when the cesspit was full a hole was made in the bottom with an iron bar, and the contents were allowed to sink away among the slag. House slops were, and are still partly, disposed of in the same way. At one house visited a water pipe had been burst by the frost, and a copious stream issued from it into a hollow place in a corner of the yard where a flag had been removed; the water at once disappeared into the ground, but there came up from the point of disappearance a strong sewer-like smell, probably from the ground-air displaced by the stream of water. An open middenstead was seen which received the slops and surface water of the back yard, the tricklings from a leaky tap, and the drip off the privy roof; it was nevertheless quite dry, all the water draining away at once into the slag. In this way the hollow foundation of the houses will have become highly impregnated with excremental filth, the emanations from which must have been drawn up into them. The cesspits have now for some years been abolished and replaced by "Board-pails" or waterclosets; but the effects of the old accumulations could not be expected to cease immediately thereupon. It is to be noted, however, that the cases of enteric fever in this part of the town occurred chiefly in 1877, the earliest year of the period taken, and have since diminished rapidly year by year.

(c.) It appears probable that in some instances local contaminations of the water in the ultimate ramifications of the pipes may have occurred. A few closets are still flushed directly from the water pipes by means of a screw-down tap, often found to be left running. In such cases it was found that on drawing water from a tap nearer the mains, the stream from the tap in the watercloset greatly diminished or ceased. It does not appear possible that a reflux from the watercloset into the pipes could take place from this cause alone, for the house tap is usually on a higher level than the watercloset seat. If, however, the main supplying a particular street were shut off, as occasionally must happen for repairs, or to make connections with new houses, an escape of water at a lower level would necessarily cause a suction into the pipes at any tap which might happen to be open, and in this way foul matters from the watercloset pans might be sucked up and distributed with the water from neighbouring taps. In one house in which a death from enteric fever had occurred, the watercloset, which was in a dirty state, being placed in such a situation as to be open to the use of passers-by in the street, was flushed by a screw-down tap; on drawing water from the house tap that in the closet ceased to run.

In some instances due care does not appear to have been taken to place the water-pipes in a safe position; in one case the water from a leaky pipe was seen welling up through a heap of ashes and house refuse.

(d.) After making all allowance for local causes of the kinds described there still remain a certain proportion of cases in which nothing could be made out respecting the mode of causation, in some from the parties having left; in others probably owing to the disease having been contracted in some way not now discoverable, *e.g.*, by personal communication. How far any



general contamination of the water supply may have caused, or shared in the causation of the disease cannot with certainty be said. As before mentioned, the public water supply is undoubtedly liable to contamination at its source by the filth of the population above the intake, and it was ascertained that cases of enteric fever had from time to time occurred among this population, some of them at least in such situations that the excreta must have entered the streams. None of these cases, however, corresponded in date with any sudden outbreak or exceptional development of enteric fever in Llanelly, such as might be expected to arise from the contamination with typhoid excreta of the general water supply of a town. From the nature of the case however the amount of specific poison reaching the water supply must be very minute, both absolutely, and relatively to the volume of water, and it would not enter the water supply direct at the time that it was cast off, but would be washed into the streams from time to time in dribblets by heavy rains. At any rate the contamination of the streams supplying the town with water is a source of danger which the Sanitary Authority would do well to obviate without delay.

Cases of enteric fever of which the cause was not ascertained have occurred from time to time in some groups of houses on the Swansea Road, partly in the urban and partly in the rural district; these houses are beyond the reach of the town sewers and water supply, water being drawn from a cistern fed by springs in a field. No source of contamination was observed, but the pipes conveying the water had recently been relaid.

*Scarlet Fever.*—An epidemic of scarlet fever occurred in the Llanelly registration sub-district in 1870, followed in the winter of 1870–71 by one of small-pox and in that of 1871–72 by one of enteric fever. From 1873, the year when separate death statistics for the Urban Sanitary District are first to be obtained, the number of deaths from scarlet fever has gradually diminished until in 1878 none were recorded.

The first case in 1879, so far as could be traced by the Medical Officer of Health and Inspector of Nuisances, was a girl, servant at an inn, who was taken ill with sore throat near the beginning of the year. She went home to her parents who lived in the town and shortly afterwards her brothers and sisters at home were similarly affected. These cases were very mild, only one having the characteristic eruption of scarlet fever. Another daughter, who was living as servant elsewhere in the town, visited her home to make inquiries after her brothers and sisters, and was soon afterwards taken ill. At the house at which she was employed there was a large family, all of whom took scarlet fever, the father alone escaping. The Medical Officer of Health has no doubt that these two households may be looked upon as centres from which the disease was sown broadcast, for not only were the families large, but nearly all suffered from it in a mild form, scarcely giving up their attendance at school, and so infecting children with whom they came in contact. The cause of the first case was not ascertained, but it is obvious that at an inn, frequented as it would be, especially on market days, by strangers from other places, opportunities for the introduction of the disease might readily occur without the knowledge of the inmates. Nor did the medical officer succeed in following out the further diffusion of the disease, but it soon assumed an epidemic form. The first death occurred on March 5th. The number of deaths in the several months has been as follows: March, 5; April, 19; May, 13; June, 16; July, 8; August, 1; September, 1; October, 2; November, 12; December, 21; January 1880, 11. It will thus be seen that the disease nearly subsided in the autumn, but broke out again in the last two months of the year in fresh parts of the town. In the earlier outbreak, the central and north-eastern parts of the town were especially affected; in the later one, the poor quarters to the south of the town, Sea-side, New Dock, and Machynis.

The total number of cases from the commencement up to the date of inspection is estimated as about 400.

Some of the parts of the town in which scarlet fever has been especially prevalent are among those which still remain unsewered, as the Wern and Machynis; in these places the house slops, containing probably the offscourings of the patients, are thrown into the gutters by the roadside.

The attendance of children at public elementary schools appears to have



been one means by which scarlet fever was diffused. It commonly happened that the first case in the family was a child attending school, and also that a number of children attending the same school were ill at about the same time. Thus in October and November many cases occurred among children attending the infant side of the Copperworks School; in December among those attending the Dock School, New Dock. All due care appears to have been taken by the school authorities to prevent the attendance of children from infected houses. Nevertheless it is highly probable that children who had had slight and unrecognised attacks may have attended school at periods when they were capable of infecting others with the disease.

To the ignorance and carelessness of the inhabitants with respect to infection, and their neglect of the most obvious precautions, the spreading of the disease must be mainly ascribed. Of this carelessness many instances came under notice. One woman, whose child died of scarlet fever, said that when it was ill, "the children in the street came backwards and forwards to the house the same as usual, and all the women in the neighbourhood came in to see it." Another admitted that her child, who was sent home from school in the morning ill of scarlet fever, was taken to chapel in the evening. The Medical Officer of Health one day stood for some time watching a house in which a child had died of scarlet fever, and saw 10 children taken in to see the corpse. A medical man said that parents instead of making use of the disinfectants furnished by the Sanitary Authority, usually threw them away in derision.

The measures taken by the Sanitary Authority to check the epidemic of scarlet fever were as follows:—An additional inspector was engaged to assist the inspector of nuisances. The several medical practitioners in the town were called on every morning, and asked to furnish lists of the cases of scarlet fever which had occurred in their practice, and this in many instances they were willing to do. A list of these cases was furnished by the clerk to the school attendance officer, who went round to the parents of the sick children, warning them not to send any of their children to school. The medical officer of health did not feel justified in recommending that the schools should be closed, considering that if the children of infected families were kept away from school, the healthy ones would be as safe there as at home, playing about, it might be, with convalescents. Houses in which scarlet fever had occurred were disinfected by diffusing in the air with a spray producer carbolic acid, Condy's fluid, or the so-called "sanitas." It is the custom to use sulphur fumigations after enteric fever, but not after scarlet fever, nor are the walls limewashed. The Authority have not any apparatus for disinfecting clothing or bedding by means of heat. An attempt was made in some cases to disinfect bedding in the ovens used in the manufacture of charcoal, but with the result of spoiling it, there being no means of properly regulating the heat.

*Hospital Accommodation.*—There is in the district no place where persons suffering from infectious diseases can be isolated; there are not even any wards for that purpose at the workhouse. It was considered by the Authority and their officers that an isolation hospital would rarely be useful, inasmuch as no one would make use of it voluntarily, and the instances in which compulsory powers could be exerted would seldom occur. It appears however from the reports of the officers, that several cases have occurred in the course of the present epidemic in which a place of the kind might advantageously have been made use of. The first case of scarlet fever, as before mentioned, was a servant at an inn who was removed home ill; if instead of being taken home she had been removed to a place of safety, it is probable that the epidemic might not have arisen. Two cases of scarlet fever occurred among inmates of common lodging houses, the keepers of which were ordered by the Authority to close their houses, a course entailing some personal hardship, which would have been unnecessary if the sick persons could have been removed to a hospital. In another case it was found that a young woman employed in milking cows and selling milk was compelled by her circumstances to attend upon her mother who was ill of fever, the only way that the Sanitary Authority could find to obviate the risk to the public thereby involved being to hire a nurse at their own cost.

In one of his annual reports the Medical Officer of Health recommends, in preference to a hospital, what he calls "home isolation," "that is removing



“ the healthy from the sick rather than the removal of the sick into “ hospitals, or in other words causing infected houses to be put in quarantine.” The mode in which this was successfully carried out in the case of an outbreak of small-pox, which was imported by a sailor in 1876, was to station a man in front and another at the back of each infected house, so as to prevent all ingress or egress. The objections to this form of “ quarantine ” are: 1st, that it does not appear that the Sanitary Authority have any power to enforce it; indeed it was said that one of the inmates of an infected house so watched jumped out of window and took shelter in a neighbouring house, whence she could not be compelled to return. 2ndly, that if it could be enforced it would inflict much unnecessary hardship, as compared with the removal of the sick, upon the other inmates of the house.

*Sanitary Administration.*—The Local Board of Health have appointed a Sanitary Committee who meet once a fortnight.

The Medical Officer of Health, Dr. H. C. Buckley, is appointed under the Local Government Board’s Order of November 11, 1872, and receives a salary of 60*l.* a year. He makes frequent inspections of his district. He is supplied by the Registrar with monthly returns of births and deaths within the district, and with a return of deaths from infectious diseases at the end of each week. He receives a return of cases attended by the Poor Law Medical Officer at the end of each year.

The Inspector of Nuisances, Mr. W. T. Rees, is also appointed under the Board’s Order at a salary of 35*s.* per week; he appears to discharge his duties with much diligence, ability, and tact. He makes every year a systematic house to house inspection of his district, entering the particulars of the sanitary condition of each house in a book for the purpose. The following is a summary of the sanitary work done in 1878:—

Houses reported as unfit for habitation	-	-	-	11
Houses closed by order of Authority	-	-	-	4
Houses reported with various sanitary defects	-	-	-	302
Number of them remedied	-	-	-	187
Nuisances reported	-	-	-	182
Number of them remedied	-	-	-	136

Legal proceedings were taken in three cases, and orders were obtained in all.

The amount of sanitary work carried out in 1878 was, however, much less than usual, owing to the depression of trade, many owners being unable through poverty to carry out the requirements of the Sanitary Authority. It was stated that delay was caused in the abatement of nuisances by a custom of the Authority that legal proceedings should not be taken for the abatement of any nuisance until three notices had been served in respect of it. No legal proceedings had been taken under the provisions against infection in the Public Health Act, except giving one notice under section 120.

In conclusion I have to express my obligations to the Llanelly Local Board of Health and their officers for their courteous and valuable assistance, as also to the other gentlemen who have kindly furnished me with information for the purposes of this report.

H. FRANKLIN PARSONS.

Local Government Board,  
May 26, 1880.

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### Recommendations.

1. Sewerage should be extended as soon as may be to those parts of the town which are still in need of it.

2. The Sanitary Authority should from time to time take steps to ascertain whether, and to what extent, the streams which furnish water to the town are liable to be contaminated by the filth of the population residing within their basins, and should put in force such legal powers as they may possess to prevent such contamination.

Means should be provided by which the water of the Lliedi when turbid with floods may be excluded from the reservoir.

The use of service cisterns should be enforced in all cases in which waterclosets are flushed direct from the pipes.

3. Continued attention should be paid to the repression of nuisances. Waterclosets, pail-closets, or other improved arrangements for the disposal of excrement should be substituted for those privies that are in such a condition as to cause nuisance. Houses that are in such a state as to be unfit for habitation should be closed until they have been rendered fit for habitation.

4. Houses in which any dangerous infectious disease has occurred should be disinfected by sulphur fumigation and limewashing or other effectual method.

5. The Authority should provide a hospital for the isolation and treatment of persons suffering from infectious diseases.

They should also provide an apparatus for the effectual disinfection of clothing and bedding by heat.

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